

10/576906

AP20 REC'D FCB 21 APR 2006

PCT/AU2004/001440

WU 2004/04/21/05

- 1 -

SEQUENCE LISTING

<110> Melbourne Health  
Southern Health  
5 Austin Health  
St. Vincent's Hospital (Melbourne) Ltd. trading as St. Vincent's  
Hospital Melbourne  
Bayside Health  
10 BARTHOLOMEUSZ, Angeline, Ingrid (US Only)  
LOCARNINI, Stephen, Alister (US Only)  
AYRES, Anna (US Only)  
YUEN, Lilly, Ka, Wai (US Only)  
SASADEUSZ, Joseph, John (US Only)

15 <120> Viral Variants; Detection and Application  
<130> 12510140/EJH  
<150> AU2003905776  
20 <151> 2003-10-21  
<150> AU2004900962  
<151> 2004-02-25

25 <160> 42  
<170> PatentIn version 3.1

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- 2 -

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25 Pro Arg Thr Pro Ala Arg Val Thr Gly Gly Val Phe Leu Val Asp Lys  
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30 Asn Pro His Asn Thr Lys Glu Ser Arg Leu Val Val Asp Phe Ser Gln  
 35 40 45

35 Phe Ser Arg Gly Ser Thr His Val Ser Trp Pro Lys Phe Ala Val Pro  
 50 55 60

40 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu  
 65 70 75 80

40 Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala  
 85 90 95

45 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro Arg Tyr Val  
 100 105 110

50 Ala Arg Leu Ser Ser Thr Ser Arg Asn Ile Asn Tyr Gln His Gly Thr  
 115 120 125

Met Gln Asp Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu  
 130 135 140

55 Leu Leu Leu Tyr Lys Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His  
 145 150 155 160

- 3 -

5 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser  
165 170 175

10 Pro Phe Leu Leu Val Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg  
180 185 190

15 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val  
195 200 205

20 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Tyr Thr Ala Ile  
210 215 220

25 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Asn Lys Thr  
225 230 235 240

30 Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly Ser  
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35 Trp Gly Thr Leu Pro Gln Glu His Ile Val Gln Lys Ile Lys  
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<210> 3  
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45 Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Lys Ser Leu  
20 25 30

50 Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Ala Pro Thr Cys  
35 40 45

55 Pro Gly Gln Asn Leu Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser  
50 55 60

60 Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe  
65 70 75 80

- 4 -

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5 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Leu Pro Gly  
                     100                    105                    110

10 Thr Ser Thr Thr Ser Thr Gly Pro Cys Lys Thr Cys Thr Thr Pro Ala  
                     115                    120                    125

15 Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp  
                     130                    135                    140

Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Val Arg  
 145                    150                    155                    160

20 Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Phe Ser Leu Leu  
                     165                    170                    175

25 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu  
                     180                    185                    190

30 Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Asn Ile  
                     195                    200                    205

35 Leu Asn Pro Phe Ile Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val  
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Tyr Ile  
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       <212> DNA  
       <213> hepatitis B virus

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ttcaggaaca gtaaaccctg ttccgacttc tgtctctcac acatcgtaa tcttctcgag 180

gattggggtc cctgcgtga acatggagaa catcacatca ggattcctag gaccctgct 240

55 cgtgttacag gcggggtttt tcttgttgac aagaatctc acaataccgc agagtctaga 300

ctcgtggtgg acttctctca attttctagg gggaactacc gtgtgtcttg gccaaaattc 360

- 5 -

gcagtcacca acctccaate actcaccaac ctctgtctt ccaacttgte ctgggtatcg 420  
 5 ctggatgtat ctgcggcggt ttatcatctt cctcttcate ctgctgetat gcctcatctt 480  
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25 <210> 5  
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 <212> PRT  
 <213> hepatitis B virus

30 <400> 5

Glu Asp Trp Gly Pro Cys Ala Glu His Gly Glu His His Ile Arg Ile  
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35 Pro Arg Thr Pro Ala Arg Val Thr Gly Gly Val Phe Leu Val Asp Lys  
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40 Asn Pro His Asn Thr Ala Glu Ser Arg Leu Val Val Asp Phe Ser Gln  
 35 40 45

45 Phe Ser Arg Gly Asn Tyr Arg Val Ser Trp Pro Lys Phe Ala Val Pro  
 50 55 60

50 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu  
 65 70 75 80

Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala  
 85 90 95

55 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Ser Arg Tyr Val  
 100 105 110

• **Unethical** – may be unethical

5

10

15

20

25

30

35

40

45

<213> hepatitis B virus

50

55

Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu  
20 25 30

- 7 -

Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Thr Thr Val Cys  
 35 40 45

5 Leu Gly Gln Asn Ser Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser  
 50 55 60

10 Cys Pro Pro Thr Cys Pro Gly Tyr Arg Trp Met Tyr Leu Arg Arg Phe  
 65 70 75 80

15 Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu Val  
 85 90 95

Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Ile Pro Gly  
 100 105 110

20 Ser Ser Thr Thr Ser Thr Gly Pro Cys Arg Thr Cys Thr Thr Pro Ala  
 115 120 125

25 Gln Gly Asn Ser Met Tyr Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp  
 130 135 140

30 Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Gly Lys  
 145 150 155 160

Phe Leu Trp Glu Trp Ala Ser Ala Arg Phe Ser Trp Leu Ser Leu Leu  
 165 170 175

35 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu  
 180 185 190

40 Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Arg Ile  
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45 Leu Ser Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val  
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50 Tyr Ile  
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55 <210> 7  
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 <213> hepatitis B virus

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 gaacagtaaa cctgtttccg actactgcct ctcccatatc gtcaatcttc tcgaggactg 240  
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 ggtggacttc tctcaatttt ctagggggaa caccaagtg tcctggccaa aatttgagc 420  
 15 ccccaacctc caatcactca ccaacctctt gtctccaat ttgtctggt tatcgtgga 480  
 tgtgtctgcy gcgttttctc atcttcctct tcactctgct gctatgcctc atcttcttgt 540  
 20 ggggtcttct ggactaccaa ggtatgttgc ccgtttgtcc tctacttcca ggaacatcaa 600  
 ctaccagcac gggaccatgc aagacctgca cgactcctgc tcaaggaaacc tctatgtttc 660  
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 35 acatattgta cacaaaatca gacaa 1045

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 40 <211> 271  
 <212> PRT  
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 50 Pro Arg Thr Pro Ala Arg Val Thr Gly Gly Val Phe Leu Val Asp Lys  
 20 25 30  
 55 Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp Phe Ser Gln  
 35 40 45



- 9 -

Phe Ser Arg Gly Asn Thr Gln Val Ser Trp Pro Lys Phe Ala Val Pro  
 50 55 60

5 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu  
 65 70 75 80

10 Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala  
 85 90 95

15 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro Arg Tyr Val  
 100 105 110

20 Ala Arg Leu Ser Ser Thr Ser Arg Asn Ile Asn Tyr Gln His Gly Thr  
 115 120 125

25 Met Gln Asp Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu  
 130 135 140

30 Leu Leu Leu Tyr Lys Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His  
 145 150 155 160

35 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser  
 165 170 175

40 Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg  
 180 185 190

45 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val  
 195 200 205

50 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Phe Thr Ala Val  
 210 215 220

55 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Thr Lys Thr  
 225 230 235 240

Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly Ser  
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Trp Gly Thr Leu Pro Gln Glu His Ile Val His Lys Ile Arg Gln  
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 20 Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Thr Pro Lys Cys  
 35 40 45  
 25 Pro Gly Gln Asn Leu Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser  
 50 55 60  
 30 Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe  
 65 70 75 80  
 Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Trp Gly  
 85 90 95  
 35 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Leu Pro Gly  
 100 105 110  
 40 Thr Ser Thr Thr Ser Thr Gly Pro Cys Lys Thr Cys Thr Thr Pro Ala  
 115 120 125  
 45 Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp  
 130 135 140  
 50 Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Ala Arg  
 145 150 155 160  
 Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Leu Ser Leu Leu  
 165 170 175  
 55 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu

- 11 -

180 185 190

5 Leu Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Asn Xaa  
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10 Leu Asn Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val  
210 215 220

15 Tyr Ile  
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 15 20 25 30  
  
 Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp Phe Ser Gln  
 35 40 45  
 20 Phe Ser Arg Gly Ser Thr Arg Val Ser Trp Pro Lys Phe Ala Val Pro  
 50 55 60  
  
 25 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu  
 65 70 75 80  
  
 30 Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala  
 85 90 95  
  
 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro Arg Tyr Val  
 100 105 110  
 35  
  
 Ala Arg Leu Ser Ser Thr Ser Arg Asn Val Asn Tyr Gln His Gly Thr  
 115 120 125  
 40  
  
 Met Gln Asp Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu  
 130 135 140  
  
 45 Met Leu Leu Tyr Lys Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His  
 145 150 155 160  
  
 50 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser  
 165 170 175  
  
 Pro Phe Leu Leu Thr Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg  
 180 185 190  
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 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val

- 13 -

195 200 205

5 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Tyr Thr Ala Ile  
210 215 220

10 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Asn Lys Thr  
225 230 235 240

15 Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly Ser  
245 250 255

Trp Gly Thr Leu Pro Gln Glu His Ile Val Leu  
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<212> PRT  
<213> hepatitis B virus

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<222> (172)..(172)  
<223> Xaa is any amino acid

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20 25 30

40 Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Glu Ala Pro Ala Cys  
35 40 45

45 Pro Gly Gln Asn Ser Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser  
50 55 60

50 Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe  
65 70 75 80

Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu Val  
85 90 95

55 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Leu Pro Gly

- 14 -

100 105 110

5 Thr Ser Thr Thr Ser Thr Gly Pro Cys Lys Thr Cys Thr Ile Pro Ala  
115 120 125

10 Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp  
130 135 140

15 Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Ala Arg  
145 150 155 160

Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Xaa Leu Ser Leu Leu  
165 170 175

20 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu  
180 185 190

25 Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Asn Ile  
195 200 205

30 Leu Ser Pro Phe Ile Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val  
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Tyr Ile  
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35 <210> 13  
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atggagagca ccacatcagg attcctagga cccctgctcg tggtacaggc ggggtttttc 240

50 ttgttgacaa gaatcctcac aataccacag agtctagact cgtggtggac ttctctcaat 300  
ttctagaggg gagcaccgac gtgtcctggc caaaatttgc agtccccaac ctccaatcac 360  
tcactaacct cttgtcctcc aatttgcct gggtatcgct ggatgtgtct gcggcggttt 420

55 atcatcttcc tcttcaccc gctgctatgc ctcattctct tgttggttct tctggactac 480

- 15 -

caagggtatgt tgcccgtttg tcctctactt ccaggaacat caactaccag cacgggacca 540  
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 5 aaaccttcgg acggaaattg cacttgatt cccatcccat catcttgggc ttctgcaaga 660  
 tccttatggg agtggggctc agtccgttcc tcattggctca gtttactagt gccatttggt 720  
 cagtgggttc tagggcttcc cccactgtt tgggtttcag ttatgtggat gatgtggat 780  
 10 tgggggcca gctgcacaa catcttgaat ccccttttac cgtattacc aattttcttt 840  
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 20 <212> PRT  
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 <223> Xaa is any amino acid

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35 Ala Arg Ser Gln Ser Glu Gly Pro Ile Leu Ser Cys Trp Trp Leu Gln  
 20 25 30

40 Phe Arg Asn Ser Lys Pro Cys Ser Asp Tyr Cys Leu Ser His Ile Val  
 35 40 45

45 Asn Leu Leu Glu Asp Trp Gly Pro Cys Thr Glu Tyr Gly Glu His His  
 50 55 60

Ile Arg Ile Pro Arg Thr Pro Ala Arg Val Thr Gly Gly Val Phe Leu  
 65 70 75 80

50 Val Asp Lys Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp  
 85 90 95

55 Phe Ser Gln Phe Ser Arg Gly Ser Thr Arg Val Ser Trp Pro Lys Phe  
 100 105 110

-16-

Ala Val Pro Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu  
115 120 125

5 Ser Trp Leu Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu  
130 135 140

10 His Pro Ala Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro  
145 150 155 160

15 Arg Tyr Val Ala Arg Leu Ser Ser Thr Ser Arg Asn Ile Asn Tyr Gln  
165 170 175

20 His Gly Thr Met Gln Asp Leu His Asp Ser Cys Ser Arg Asn Leu Tyr  
180 185 190

25 Val Ser Leu Leu Leu Leu Tyr Lys Thr Phe Gly Arg Lys Leu His Leu  
195 200 205

Tyr Ser His Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val  
210 215 220

30 Gly Leu Ser Pro Phe Leu Met Ala Gln Phe Thr Ser Ala Ile Cys Ser  
225 230 235 240

35 Val Val Arg Arg Ala Phe Pro His Cys Leu Val Phe Ser Tyr Val Asp  
245 250 255

40 Asp Val Val Leu Gly Ala Lys Ser Ala Gln His Leu Glu Ser Leu Phe  
260 265 270

45 Thr Ala Ile Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Xaa  
275 280 285

Asn Lys Thr Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Gly  
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55 <210> 15  
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<213> hepatitis B virus



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 20 25 30

25 Val Arg Gly Leu Tyr Phe Pro Ala Gly Gly Ser Ser Ser Gly Thr Val  
 35 40 45

30 Asn Pro Val Pro Thr Thr Ala Ser Pro Ile Ser Ser Ile Phe Ser Arg  
 50 55 60

35 Thr Gly Asp Pro Ala Pro Asn Met Glu Ser Thr Thr Ser Gly Phe Leu  
 65 70 75 80

Gly Pro Leu Leu Val Leu Gln Ala Gly Phe Phe Leu Leu Thr Arg Ile  
 65 90 95

40 Leu Thr Ile Pro Gln Ser Leu Asp Ser Trp Trp Thr Ser Leu Asn Phe  
 100 105 110

45 Leu Gly Gly Ala Pro Ala Cys Pro Gly Gln Asn Leu Gln Ser Pro Thr  
 115 120 125

50 Ser Asn His Ser Leu Thr Ser Cys Pro Pro Ile Cys Pro Gly Tyr Arg  
 130 135 140

Trp Met Cys Leu Arg Arg Phe Ile Ile Phe Leu Phe Ile Leu Leu Leu  
 145 150 155 160

55 Cys Leu Ile Phe Leu Leu Val Leu Leu Asp Tyr Gln Gly Met Leu Pro  
 165 170 175

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5 Val Cys Pro Leu Leu Pro Gly Thr Ser Thr Thr Ser Thr Gly Pro Cys  
180 185 190

10 Lys Thr Cys Thr Thr Pro Ala Gln Gly Thr Ser Met Phe Pro Ser Cys  
195 200 205

15 Cys Cys Thr Lys Pro Ser Asp Gly Asn Cys Thr Cys Ile Pro Ile Pro  
210 215 220

20 Ser Ser Trp Ala Phe Ala Arg Phe Leu Trp Glu Trp Ala Ser Val Arg  
225 230 235 240

25 Phe Ser Trp Leu Ser Leu Leu Val Pro Phe Val Gln Trp Phe Val Gly  
245 250 255

30 Leu Ser Pro Thr Val Trp Phe Ser Val Met Trp Met Met Trp Tyr Trp  
260 265 270

35 Gly Pro Ser Leu His Asn Ile Leu Asn Pro Phe Leu Pro Leu Leu Pro  
275 280 285

40 Ile Phe Phe Cys Leu Trp Val Tyr Ile Xaa Thr Xaa Ile Lys Pro Asn  
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45 Val Gly Ala  
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50 ggggcctata ctttcttgct ggtggctcca gttccggaac agtaaacctt gttccgacta 180  
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55 caagaatcct cacaatacca cagagtctag actcgtgggtg gacttctctc aattttctag 360  
ggggagcacc cactgtcctt ggccaaaatt tgcagtcacc aacctccaat cactcacaa 420

cctcttgtcc tccaatttgt cctgggtatc gctggatgtg tctgcgcggt tttatcatct 480  
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 gggagtgggc ctgagtcctg ttctcctggc tcagtttact agtgccattt gttcagtggg 780  
 15 tcttaggggt tcccccaact gtttggcttt cagttatatg gatgatgtgg tattgggggc 840  
 caagtctgta caacatcttg aatccctttt taccgctgtt accaattttc tttgtcttt 900  
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 20 atatgtaatt ggaagtggg gtaccttg 988  
  
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 25 <212> PRT  
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 20 25 30  
  
 40 Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp Phe Ser Gln  
 35 40 45  
  
 45 Phe Ser Arg Gly Ser Thr His Val Ser Trp Pro Lys Phe Ala Val Pro  
 50 55 60  
  
 50 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu  
 65 70 75 80  
  
 55 Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala  
 85 90 95  
  
 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro Arg Tyr Val  
 100 105 110

- 20 -

Ala Arg Leu Ser Ser Thr Ser Arg Asn Ile Asn Tyr Gln His Gly Thr  
 115 120 125

5 Met Gln Asp Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu  
 130 135 140

10 Leu Leu Leu Tyr Lys Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His  
 145 150 155 160

15 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser  
 165 170 175

Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg  
 180 185 190

20 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val  
 195 200 205

25 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Phe Thr Ala Val  
 210 215 220

30 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Thr Lys Thr  
 225 230 235 240

Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly Ser  
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35 Trp Gly

40 <210> 18  
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45 <400> 18

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50 Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu  
 20 25 30

55 Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Ala Pro Thr Cys  
 35 40 45

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5 Pro Gly Gln Asn Leu Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser  
50 55 60

10 Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe  
65 70 75 80

15 Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu Val  
85 90 95

20 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Leu Pro Gly  
100 105 110

25 Thr Ser Thr Thr Ser Thr Gly Pro Cys Lys Thr Cys Thr Thr Pro Ala  
115 120 125

30 Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp  
130 135 140

35 Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Ala Arg  
145 150 155 160

40 Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Leu Ser Leu Leu  
165 170 175

45 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu  
180 185 190

50 Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Asn Ile  
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55 Leu Asn Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val  
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Tyr Ile  
225

<210> 19  
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<211> 258

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<400> 20

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60

- 23 -

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10     Ser Leu Asp Val Ser Ala Ala Phe Tyr His Ile Pro Leu His Pro Ala  
                               85                                90                                95

15     Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Ser Arg Tyr Val  
                               100                                105                                110

20     Ala Arg Leu Ser Ser Asn Ser Arg Ile Leu Asn His Gln His Gly Asn  
                               115                                120                                125

25     Met Pro Asn Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu  
                               130                                135                                140

30     Leu Leu Leu Tyr Gln Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His  
                               145                                150                                155                                160

35     Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser  
                               165                                170                                175

40     Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg  
                               180                                185                                190

45     Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val  
                               195                                200                                205

50     Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Phe Thr Ala Val  
                               210                                215                                220

55     Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Thr Pro Asn Lys Thr  
                               225                                230                                235                                240

60     Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly Ser  
                               245                                250                                255

65     Tyr Gly

70     <210> 21  
       <211> 226  
       <212> PRT

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&lt;213&gt; hepatitis B virus

&lt;400&gt; 21

5 Met Glu Asn Ile Thr Ser Gly Leu Leu Gly Pro Leu Leu Val Leu Gln  
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 10 Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu  
 20 25 30  
 15 Asp Ser Trp Trp Thr Ser Leu Ser Phe Leu Gly Gly Thr Thr Val Cys  
 35 40 45  
 20 Leu Gly Gln Asn Ser Arg Ser Pro Thr Ser Asn His Ser Pro Thr Ser  
 50 55 60  
 25 Cys Pro Pro Thr Cys Pro Gly Tyr Arg Trp Met Tyr Leu Arg Arg Phe  
 65 70 75 80  
 30 Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu Val  
 85 90 95  
 35 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Ile Pro Gly  
 100 105 110  
 40 Ser Ser Thr Thr Ser Thr Gly Thr Cys Arg Thr Cys Thr Thr Pro Ala  
 115 120 125  
 45 Gln Gly Thr Ser Met Tyr Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp  
 130 135 140  
 50 Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Gly Lys  
 145 150 155 160  
 55 Phe Leu Trp Glu Trp Ala Ser Ala Arg Phe Ser Trp Leu Ser Leu Leu  
 165 170 175  
 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu  
 180 185 190  
 Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Ser Ile  
 195 200 205  
 Leu Ser Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val



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210 215 220

5 Tyr Ile  
225

10 <210> 22  
<211> 1037  
<212> DNA  
<213> hepatitis B virus

<400> 22

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tgagagacac tcatectcag gccgtgcagt ggaactccac aaccttccac caaactctgc 120  
aagatcccag agtgagaggc ctgtatttcc ctgctggtgg ctccagttca ggaacagtaa 180  
20 accctgttcc gaccactgcc tctcccttat cgtcaatctt ctgaggatt ggggaccctg 240  
cgtgaacat ggagaacatc acatcaggat tcttaggacc cttctcgtg ttacaggcgg 300  
25 ggtttttctt gttgacaaga atcttcacaa taccgcagag tctagactcg tgggtgactt 360  
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30 ggcgttttat catattctc ttcatectgc tgetatgect catcttcttg ttggttcttc 540  
tggaactatca aggtatgttg ccggtttgtc ctctaattcc aggatcctca accaccagca 600  
35 cgggaccatg ccgaacctgc acgactcctg ctcaaggaa cctctatgtat cctcctgtt 660  
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45 ttttcttttg tctttgggta tacatttaaa ccctaacaaa acgaaaagat ggggttactc 960  
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acaaaaa 1027

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<212> PRT  
<213> hepatitis B virus

55 <400> 23

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 5 Pro Arg Thr Pro Ser Arg Val Thr Gly Gly Val Phe Leu Val Asp Lys  
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 10 Asn Pro His Asn Thr Ala Glu Ser Arg Leu Val Val Asp Phe Ser Gln  
 35 40 45  
 15 Phe Ser Arg Gly Asn His Arg Val Ser Trp Pro Lys Phe Ala Val Pro  
 50 55 60  
 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu  
 65 70 75 80  
 20 Ser Leu Asp Val Ser Ala Ala Phe Tyr His Ile Pro Leu His Pro Ala  
 85 90 95  
 25 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Ser Arg Tyr Val  
 100 105 110  
 30 Ala Arg Leu Ser Ser Asn Ser Arg Ile Leu Asn His Gln His Gly Thr  
 115 120 125  
 Met Pro Asn Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu  
 130 135 140  
 35 Leu Leu Leu Tyr Gln Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His  
 145 150 155 160  
 40 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser  
 165 170 175  
 45 Pro Phe Leu Met Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg  
 180 185 190  
 50 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Val Asp Asp Val Val  
 195 200 205  
 Leu Gly Ala Lys Ser Val Ser His Leu Glu Ser Leu Phe Thr Ala Val  
 210 215 220  
 55 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Asn Lys Thr

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225                      230                      235                      240  
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 Tyr Gly Ser Leu Pro Gln Glu His  
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 Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu  
 25                      20                      25                      30  
 Asp Ser Trp Trp Thr Ser Leu Ser Phe Leu Gly Glu Thr Thr Val Cys  
                                  35                      40                      45  
 30 Leu Gly Gln Asn Ser Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser  
                                  50                      55                      60  
 35 Cys Pro Pro Thr Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe  
     65                      70                      75                      80  
 40 Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu Val  
                                  85                      90                      95  
 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Ile Pro Gly  
 45                      100                      105                      110  
 Ser Ser Thr Thr Ser Thr Gly Pro Cys Arg Thr Cys Thr Thr Pro Ala  
                                  115                      120                      125  
 50 Gln Gly Thr Ser Met Tyr Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp  
                                  130                      135                      140  
 55 Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Ala Lys  
     145                      150                      155                      160

- 28 -

Phe Leu Trp Glu Trp Gly Ser Ala Arg Phe Ser Trp Leu Ser Leu Leu  
 165 170 175  
 5 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu  
 180 185 190  
 10 Ser Val Met Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Arg Ile  
 195 200 205  
 15 Leu Ser Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val  
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 Tyr Ile  
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 35 ctgctcaagg aacctctatg tatccctcat gttgctgtac caaaccttcg gacggaaatt 240  
 gcacctgtat tcccatccca tcatectggg ctttcggaaa attcctatgg gaggggcct 300  
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 40 cccccattgt ttggttttca gttatgtgga tgatgtggta ttgggggcca agtctgtatc 420  
 gcatcttgag tcccttttta ccgctgttac caattttctt ttgtctctgg gtatacatct 480  
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 50 <211> 186  
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5
Leu Ser Arg Tyr Val Ala Arg Leu Ser Ser Thr Ser Arg Ile Phe Asn
  35                      40                      45
10
His Gln His Gly Ser Met Gln Asn Leu His Asp Ser Cys Ser Arg Asn
  50                      55                      60
15
Leu Tyr Val Ser Leu Met Leu Leu Tyr Gln Thr Phe Gly Arg Lys Leu
  65                      70                      75                      80
20
His Leu Tyr Ser His Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met
  85                      90                      95
25
Gly Val Gly Leu Ser Pro Phe Leu Met Ala Gln Phe Thr Ser Ala Ile
  100                     105                     110
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Cys Ser Val Val Arg Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr
  115                     120                     125
35
Val Asp Asp Val Val Leu Gly Ala Lys Ser Val Ser His Leu Glu Ser
  130                     135                     140
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Leu Phe Thr Ala Val Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu
  145                     150                     155                     160
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Asn Pro His Lys Thr Lys Arg Trp Gly Tyr Ser Leu His Phe Met Gly
  165                     170                     175
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Tyr Val Ile Gly Cys Tyr Gly Ser Leu Pro
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 Tyr Arg Gly Met Leu Pro Val Cys Pro Leu Leu Pro Gly Ser Ser Thr  
 35 40 45  
 Thr Ser Thr Gly Pro Cys Arg Thr Cys Thr Thr Pro Ala Gln Gly Thr  
 50 55 60  
 Ser Met Tyr Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp Gly Asn Cys  
 65 70 75 80  
 Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Gly Lys Phe Leu Trp  
 85 90 95  
 Glu Trp Ala Ser Ala Arg Phe Ser Trp Leu Ser Leu Leu Val Pro Phe  
 100 105 110  
 Val Gln Trp Phe Val Gly Leu Ser Pro Ile Val Trp Leu Ser Val Met  
 115 120 125  
 Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Arg Ile Leu Ser Pro  
 130 135 140  
 Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val Tyr Ile Xaa  
 145 150 155 160

&lt;210&gt; 28

&lt;211&gt; 1029

45 &lt;212&gt; DNA

&lt;213&gt; hepatitis B virus

&lt;400&gt; 28

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 gctagatccc aragtgagrg gcctatactt tctgctggt ggctccagtt ccggaacagt 180  
 aaacctgtt ccgactactg cctctcccat atcgtaate ttctcgagga ctggggaccc 240  
 tgcaccgaat atggagagca caacatcagg attcctagga ccctgctcg tggtacaggc 300

- 31 -

5 ggggtttttc ttgttgacaa gaatcctcac aataccacag agtctagacc cgtggtggac 360  
 ttctctcaat ttctagggg gagcaccac gtgtcctggc caaaatttgc agtccccaac 420  
 ctccaatcac tcaccaacct cttgtctccc aatttgtcct gggtatcgct ggatgtgtct 480  
 gcggcgtttt atcatcttcc tcttcaccc gctgctatgc ctcatcttct tgtkggttct 540  
 10 tctggactac caaggtatgt tgcccgtttg tctctactt ccaggaacat caactaccag 600  
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 15 ttgctgtaca aaaccttcgg acggaaattg cacttgtatt cccatcccat catcttgggc 720  
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 aattttcttt tgtctttggg tatacattta aaccctacta aaactaaacg ttggggctac 960  
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 gtacacaaa 1029

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35 <400> 29

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 20 25 30

45 Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp Phe Ser Gln  
 35 40 45

50 Phe Ser Arg Gly Ser Thr His Val Ser Trp Pro Lys Phe Ala Val Pro  
 50 55 60

55 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu  
 65 70 75 80

Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala  
 85 90 95

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Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Pro Arg Tyr Val  
100 105 110

Ala Arg Leu Ser Ser Thr Ser Arg Asn Ile Asn Tyr Gln His Gly Thr  
115 120 125

Met Gln Asp Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu  
130 135 140

Leu Leu Leu Tyr Lys Thr Phe Gly Arg Lys Leu His Leu Tyr Ser His  
145 150 155 160

Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser  
165 170 175

Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val Arg  
180 185 190

Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val  
195 200 205

Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Phe Thr Ala Val  
210 215 220

Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Thr Lys Thr  
225 230 235 240

Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly Ser  
245 250 255

Trp Gly Thr Leu Pro Gln Glu His Ile Val His Lys  
260 265

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<211> 226  
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<222> (95)..(95)  
<223> Xaa is any amino acid



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 Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu  
 20 25 30  
 10 Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Ala Pro Thr Cys  
 35 40 45  
 15 Pro Gly Gln Asn Leu Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser  
 50 55 60  
 20 Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe  
 65 70 75 80  
 Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Xaa Val  
 85 90 95  
 25 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Leu Pro Gly  
 100 105 110  
 30 Thr Ser Thr Thr Ser Thr Gly Pro Cys Lys Thr Cys Thr Ile Pro Ala  
 115 120 125  
 35 Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp  
 130 135 140  
 40 Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Ala Arg  
 145 150 155 160  
 Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Leu Ser Leu Leu  
 165 170 175  
 45 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu  
 180 185 190  
 50 Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Asn Ile  
 195 200 205  
 55 Leu Asn Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val  
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Tyr Ile  
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tagatcccag agtgaggggc ctatacttcc ctgctgggtg ctcagttca ggaacagtaa 180  
acctgttcc gactactgcc tctcccatat cgtcaatctt ctcgaggact ggggacctg 240  
caccgaatat ggagagcacc acatcaggat tcttaggacc cctgctcgtg ttacaggcgg 300  
ggtttttttt gttgacaaga atcctcacaa taccacagag tctagactcg tgggtgactt 360  
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ccaatcactc accaacctct tgtcctccaa tttgtcctgg ttatcgctgg atgtgtctgc 480  
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cgggacctg caagacctgc acgattcctg ctcaaggaa cctctatgtt cctcttctgt 660  
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tcgcaagatt cctatgggag tgggcctcag tccgtttctc ctggctcagt ttactagtgc 780  
catttgttca gtggttcgta gggctttccc ccactgtttg gctttcagtt atatggatga 840  
tgtggtattg ggggccaaagt ctgtacaaca tcttgaatcc ctttttaccg ctgttaccas 900  
ttttcttttg tctttgggta tacatttaaa ccttctaaa accaaaagtt ggggttactc 960  
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 20 25 30  
 15 Gln His Ile Pro Pro Ser Ser Ala Arg Ser Gln Ser Glu Gly Pro Ile  
 35 40 45  
 20 Leu Ser Cys Trp Trp Leu Gln Phe Arg Asn Ser Lys Pro Cys Ser Asp  
 50 55 60  
 Tyr Cys Leu Ser His Ile Val Asn Leu Leu Glu Asp Trp Gly Pro Cys  
 65 70 75 80  
 25 Thr Glu Tyr Gly Glu His His Ile Arg Ile Pro Arg Thr Pro Ala Arg  
 85 90 95  
 30 Val Thr Gly Gly Val Phe Leu Val Asp Lys Asn Pro His Asn Thr Thr  
 100 105 110  
 35 Glu Ser Arg Leu Val Val Asp Phe Ser Gln Phe Ser Arg Gly Ser Thr  
 115 120 125  
 His Val Ser Trp Pro Lys Phe Ala Val Pro Asn Leu Gln Ser Leu Thr  
 130 135 140  
 40 Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu Ser Leu Asp Val Ser Ala  
 145 150 155 160  
 45 Ala Phe Tyr His Leu Pro Leu His Pro Ala Ala Met Pro His Leu Leu  
 165 170 175  
 50 Val Gly Ser Ser Gly Leu Pro Arg Tyr Val Ala Arg Leu Ser Ser Thr  
 180 185 190  
 55 Ser Arg Asn Ile Asn Tyr Gln His Gly Thr Met Gln Asp Leu His Asp  
 195 200 205  
 Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu Leu Leu Tyr Lys Thr

- 36 -

210                      215                      220  
 5    Phe Gly Arg Lys Leu His Leu Tyr Ser His Pro Ile Ile Leu Gly Phe  
      225                      230                      235                      240  
  
 10    Arg Lys Ile Pro Met Gly Val Gly Leu Ser Pro Phe Leu Leu Ala Gln  
                           245                      250                      255  
  
 15    Phe Thr Ser Ala Ile Cys Ser Val Val Arg Arg Ala Phe Pro His Cys  
                           260                      265                      270  
  
 20    Leu Ala Phe Ser Tyr Met Asp Asp Val Val Leu Gly Ala Lys Ser Val  
                           275                      280                      285  
  
 25    Gln His Leu Glu Ser Leu Phe Thr Ala Val Thr Asn Phe Leu Leu Ser  
                           290                      295                      300  
  
 30    Leu Gly Ile His Leu Asn Pro Xaa Lys Thr Lys Arg Trp Gly Tyr Ser  
                           305                      310                      315                      320  
  
 35    Leu Asn Phe Met Gly Tyr Val Ile Gly Ser Trp Gly Thr Leu Pro Gln  
                           325                      330                      335  
  
 40    Glu His Ile Val His Lys Ile Lys  
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      <211> 344  
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- 37 -

Ser Pro Pro Leu Arg Asp Ser His Pro Gln Ala Met Gln Trp Asn Ser  
 20 25 30  
 5 Ser Thr Phe His Gln Ala Leu Leu Asp Pro Arg Val Arg Gly Leu Tyr  
 35 40 45  
 10 Phe Pro Ala Gly Gly Ser Ser Ser Gly Thr Val Asn Pro Val Pro Thr  
 50 55 60  
 15 Thr Ala Ser Pro Ile Ser Ser Ile Phe Ser Arg Thr Gly Asp Pro Ala  
 65 70 75 80  
 20 Pro Asn Met Glu Ser Thr Thr Ser Gly Phe Leu Gly Pro Leu Leu Val  
 85 90 95  
 25 Leu Gln Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln  
 100 105 110  
 30 Ser Leu Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Ala Pro  
 115 120 125  
 35 Thr Cys Pro Gly Gln Asn Leu Gln Ser Pro Thr Ser Asn His Ser Pro  
 130 135 140  
 40 Thr Ser Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg  
 145 150 155 160  
 45 Arg Phe Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu  
 165 170 175  
 50 Leu Val Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Leu  
 180 185 190  
 55 Pro Gly Thr Ser Thr Thr Ser Thr Gly Pro Cys Lys Thr Cys Thr Ile  
 195 200 205  
 60 Pro Ala Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro  
 210 215 220  
 65 Ser Asp Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe  
 225 230 235 240

- 38 -

Ala Arg Phe Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Leu Ser  
 245 250 255

5 Leu Leu Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val  
 260 265 270

10 Trp Leu Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr  
 275 280 285

15 Asn Ile Leu Asn Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu  
 290 295 300

20 Trp Val Tyr Ile Xaa Thr Leu Leu Lys Pro Asn Val Gly Val Thr Pro  
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Leu Thr Ser Trp Asp Met Xaa Leu Glu Val Gly Val Pro Tyr His Arg  
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25 Asn Ile Leu Tyr Thr Lys Ser Asn  
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30 <210> 34  
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 <213> hepatitis B virus

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 tactttctctg ctgggtggctc cagttcagga acagtgagec ctgctcagaa tactgcctct 180  
 gccatatcgt caaccttctc gaagactggg gacctgtac cgaacatgga gaacatcgca 240  
 tcaggactcc taggacctct gctcgcgta caggcggggg tttctctggt gacaaaaatc 300  
 45 ctcacaatac cacagagtct agactcgttg tggacttctc tcaattttct agggggaaca 360  
 cccgtgtgtc ttggccaaaa ttgcagtc ccaatctcca gtcactcacc aacttggtgt 420  
 cctccaattt gtcttggtta tcgctggatg tgtctgcggc gttttatcat ctctctctgc 480  
 50 atctctgtgc tatgcctcat ctcttggttg gttcttctgg actatcaagg tatgttgccc 540  
 gtttgctctc taattccagg atcatcaacc accagcaccg gaccatgcag aacctgcacg 600  
 55 actcctgtct aaggaacctc tatgtttccc tcattgttgc gtacaaaacc tacggacgga 660  
 aactgcacct gtattcccat cccatcatct tgggctttcg caaaatacct atgggagtg 720

- 39 -

gcctcagtcg gttctctctg gctcagttta ctagtgcctg ttgttcagtg gttcgtaggg 780  
 5 ctttccccca ctgtctggct ttcagttata tggatgatgt ggtattgggg gccaaagtctg 840  
 tacaacatct tgagtcctct tatgccgctg ttaccaattt tcttttctct ttgggtatac 900  
 atttaaaccc tcacaaaaca aaaagatggg gatattccct tcaattcatg ggatagttaa 960  
 10 ttggggggtg gggctccttg 980

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 <211> 258  
 15 <212> PRT  
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20 Glu Asp Trp Gly Pro Cys Thr Glu His Gly Glu His Arg Ile Arg Thr  
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 25 Pro Arg Thr Pro Ala Arg Val Thr Gly Gly Val Phe Leu Val Asp Lys  
 20 25 30  
 30 Asn Pro His Asn Thr Thr Glu Ser Arg Leu Val Val Asp Phe Ser Gln  
 35 40 45  
 Phe Ser Arg Gly Asn Thr Arg Val Ser Trp Pro Lys Phe Ala Val Pro  
 50 55 60  
 35 Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp Leu  
 65 70 75 80  
 40 Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro Ala  
 85 90 95  
 45 Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Ser Arg Tyr Val  
 100 105 110  
 50 Ala Arg Leu Ser Ser Asn Ser Arg Ile Ile Asn His Gln His Arg Thr  
 115 120 125  
 Met Gln Asn Leu His Asp Ser Cys Ser Arg Asn Leu Tyr Val Ser Leu  
 130 135 140  
 55 Met Leu Leu Tyr Lys Thr Tyr Gly Arg Lys Leu His Leu Tyr Ser His  
 145 150 155 160

- 40 -

5 Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu Ser  
 165 170 175

10 Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Val Cys Ser Val Val Arg  
 180 185 190

15 Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val Val  
 195 200 205

20 Leu Gly Ala Lys Ser Val Gln His Leu Glu Ser Leu Tyr Ala Ala Val  
 210 215 220

25 Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro His Lys Thr  
 225 230 235 240

30 Lys Arg Trp Gly Tyr Ser Leu Gln Phe Met Gly Tyr Val Ile Gly Gly  
 245 250 255

35 Trp Gly

40 <210> 36  
 <211> 226  
 <212> PRT  
 <213> hepatitis B virus  
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50 Ala Gly Phe Phe Ser Leu Thr Lys Ile Leu Thr Ile Pro Gln Ser Leu  
 20 25 30

55 Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Thr Pro Val Cys  
 35 40 45

60 Leu Gly Gln Asn Ser Gln Ser Gln Ile Ser Ser His Ser Pro Thr Cys  
 50 55 60

65 Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe  
 65 70 75 80



- 41 -

Ile Ile Phe Leu Cys Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu Val  
85 90 95

5 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Ile Pro Gly  
100 105 110

10 Ser Ser Thr Thr Ser Thr Gly Pro Cys Arg Thr Cys Thr Thr Pro Ala  
115 120 125

15 Gln Gly Thr Ser Met Phe Pro Ser Cys Cys Cys Thr Lys Pro Thr Asp  
130 135 140

Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Ala Lys  
145 150 155 160

20 Tyr Leu Trp Glu Trp Ala Ser Val Arg Phe Ser Trp Leu Ser Leu Leu  
165 170 175

25 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu  
180 185 190

30 Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Asn Ile  
195 200 205

35 Leu Ser Pro Phe Met Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val  
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Tyr Ile  
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ttctaggac ccttctcgt gttacaggcg gggttttct tgttgacaag aatctcaca 180  
ataccgcaga gtctagactc gtggtggact tctctcaatt ttcgaggggg aactaccgtg 240  
55 tgtcttggcc aaaattcgca gtccccaacc tccaatcact caccaacctc ctgtctcca 300  
actgtcctg gttatcgctg gatgtgtctg cggcgtttta tcatmttct cttcatcctg 360

- 42 -

ctgctatgcc tcattctctt gttggttctt ctggactatc raggtatgtt gcccgtttgt 420  
 5 cctctaattc caggatcttc awccaccagc acgggacctg gccgaacctg catgactact 480  
 gctcaaggaa cctctatgta tccctctctg tgctgtacca aacctacgga cggzaattgc 540  
 acctgtattc ccattccatc atcctgggct ttcggaaaat tcctatggga gtgggcctca 600  
 10 gcccgtttct cctggctcag ttactagtg ccatttgttc agtggttcgt agggctttcc 660  
 cccactgttt ggctttcagt tatatggatg atgtggtatt gggggccaag tctgtaymge 720  
 15 atcttgagtc cctttttacc gctgttacc atttctcttt gtctttgggt atacatttaa 780  
 accctaacaa aacaaagaga tggggttact ctctgaattt tatgggttat gtcattggaa 840  
 gttatgggtc cttgccacaa gaacacatca tacaaaaaat caaagaatgt tttagaaaac 900

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 <213> hepatitis B virus

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50 Leu Ser Leu Ile Val Asn Leu Leu Glu Asp Trp Gly Pro Cys Ala Glu  
 20 25 30

55 His Gly Glu His His Ile Arg Ile Pro Arg Thr Pro Ser Arg Val Thr  
 35 40 45

- 43 -

Gly Gly Val Phe Leu Val Asp Lys Asn Pro His Asn Thr Ala Glu Ser  
 50 55 60

5 Arg Leu Val Val Asp Phe Ser Gln Phe Ser Arg Gly Asn Tyr Arg Val  
 65 70 75 80

10 Ser Trp Pro Lys Phe Ala Val Pro Asn Leu Gln Ser Leu Thr Asn Leu  
 85 90 95

15 Leu Ser Ser Asn Leu Ser Trp Leu Ser Leu Asp Val Ser Ala Ala Phe  
 100 105 110

Tyr His Xaa Pro Leu His Pro Ala Ala Met Pro His Leu Leu Val Gly  
 115 120 125

20 Ser Ser Gly Leu Ser Arg Tyr Val Ala Arg Leu Ser Ser Asn Ser Arg  
 130 135 140

25 Ile Leu Xaa His Gln His Gly Thr Met Pro Asn Leu His Asp Tyr Cys  
 145 150 155 160

30 Ser Arg Asn Leu Tyr Val Ser Leu Leu Leu Leu Tyr Gln Thr Tyr Gly  
 165 170 175

35 Arg Lys Leu His Leu Tyr Ser His Pro Ile Ile Leu Gly Phe Arg Lys  
 180 185 190

40 Ile Pro Met Gly Val Gly Leu Ser Pro Phe Leu Leu Ala Gln Phe Thr  
 195 200 205

45 Ser Ala Ile Cys Ser Val Val Arg Arg Ala Phe Pro His Cys Leu Ala  
 210 215 220

50 Phe Ser Tyr Met Asp Asp Val Val Leu Gly Ala Lys Ser Val Xaa His  
 225 230 235 240

55 Leu Glu Ser Leu Phe Thr Ala Val Thr Asn Phe Leu Leu Ser Leu Gly  
 245 250 255

Ile His Leu Asn Pro Asn Lys Thr Lys Arg Trp Gly Tyr Ser Leu Asn  
 260 265 270

Phe Met Gly Tyr Val Ile Gly Ser Tyr Gly Ser Leu Pro Gln Glu His

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275                      280                      285  
 5    Ile Ile Gln Lys Ile Lys Glu Cys Phe Arg Lys  
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      <211> 259  
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 25    <220>  
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      Ala Ser Pro Leu Ser Ser Ile Phe Ser Arg Ile Gly Asp Pro Ala Leu  
                     20                      25                      30  
  
 40    Asn Met Glu Asn Ile Thr Ser Gly Phe Leu Gly Pro Leu Leu Val Leu  
                     35                      40                      45  
  
 45    Gln Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser  
                     50                      55                      60  
  
 50    Leu Asp Ser Trp Trp Thr Ser Leu Asn Phe Arg Gly Gly Thr Thr Val  
      65                      70                      75                      80  
  
      Cys Leu Gly Gln Asn Ser Gln Ser Pro Thr Ser Asn His Ser Pro Thr  
                     85                      90                      95  
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      Ser Cys Pro Pro Thr Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg

- 45 -

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5	Phe Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu 115 120 125		
10	Val Leu Leu Asp Tyr Xaa Gly Met Leu Pro Val Cys Pro Leu Ile Pro 130 135 140		
	Gly Ser Ser Xaa Thr Ser Thr Gly Pro Cys Arg Thr Cys Met Thr Thr 145 150 155 160		
15	Ala Gln Gly Thr Ser Met Tyr Pro Ser Cys Cys Cys Thr Lys Pro Thr 165 170 175		
20	Asp Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Gly 180 185 190		
25	Lys Phe Leu Trp Glu Trp Ala Ser Ala Arg Phe Ser Trp Leu Ser Leu 195 200 205		
30	Leu Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp 210 215 220		
35	Leu Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Xaa 225 230 235 240		
40	Ile Leu Ser Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp 245 250 255		
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	<211> 912		
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	<213> hepatitis B virus		
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55	gaacatggag aacatcacat caggattcct aggaccctt ctctgtttac aggcggggtt	180	
	tttcttggtg acaagaatcc tcacaatacc gcagagtcta gactcgtggt ggacttctct	240	

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caattttcta gggggaacta ccgtgtgtct tggccaaaat tcgcagtcce caacctocaa 300  
 tcactcacca acctctgtc ctccaacttg tcctggltat cgctggatgt gtctgcggcg 360  
 5 ttttatcacc ttctcttcca tcctgtgtct atgcctcacc ttcttggttg ttcttctgga 420  
 ctatcraggt atgttgcccg tttgtctctt aattocagga ttctcaacca ccagcacggg 480  
 accatgccga acctgcacga ctactgtcca aggaacctct atgtaccct cctgttgctg 540  
 10 taccaaacct acggacggaa attgcacctg tattccacc ccacacacct gggctttcgg 600  
 aaaattccta tgggagtggg cctcagcccg ttctctctgg ctacgtttac tagtgccatt 660  
 15 tgttcagtgg ttcgtagggc ttccccccac tgtttggctt tcagttatat ggatgatgtg 720  
 gtattggggg ccaagtctgy acagcatctt gagtccttt ttaccgcggt gaccaatttt 780  
 20 cttttgtctt tgggtataca tttaaaccct aacaaaacaa agagatgggg ttactctctg 840  
 aattttatgg gttatgtcat tggaagttat gggctcttgc cacaagaaca catcatacaa 900  
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 45 20 25 30  
 Leu Glu Asp Trp Gly Pro Cys Ala Glu His Gly Glu His His Ile Arg  
 35 40 45  
 50  
 Ile Pro Arg Thr Pro Ser Arg Val Thr Gly Gly Val Phe Leu Val Asp  
 50 55 60  
 55 Lys Asn Pro His Asn Thr Ala Glu Ser Arg Leu Val Val Asp Phe Ser  
 65 70 75 80

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Gln Phe Ser Arg Gly Asn Tyr Arg Val Ser Trp Pro Lys Phe Ala Val  
 85 90 95  
 5 Pro Asn Leu Gln Ser Leu Thr Asn Leu Leu Ser Ser Asn Leu Ser Trp  
 100 105 110  
 10 Leu Ser Leu Asp Val Ser Ala Ala Phe Tyr His Leu Pro Leu His Pro  
 115 120 125  
 15 Ala Ala Met Pro His Leu Leu Val Gly Ser Ser Gly Leu Ser Arg Tyr  
 130 135 140  
 20 Val Ala Arg Leu Ser Ser Asn Ser Arg Ile Leu Asn His Gln His Gly  
 145 150 155 160  
 Thr Met Pro Asn Leu His Asp Tyr Cys Ser Arg Asn Leu Tyr Val Ser  
 165 170 175  
 25 Leu Leu Leu Leu Tyr Gln Thr Tyr Gly Arg Lys Leu His Leu Tyr Ser  
 180 185 190  
 30 His Pro Ile Ile Leu Gly Phe Arg Lys Ile Pro Met Gly Val Gly Leu  
 195 200 205  
 35 Ser Pro Phe Leu Leu Ala Gln Phe Thr Ser Ala Ile Cys Ser Val Val  
 210 215 220  
 40 Arg Arg Ala Phe Pro His Cys Leu Ala Phe Ser Tyr Met Asp Asp Val  
 225 230 235 240  
 Val Leu Gly Ala Lys Ser Xaa Gln His Leu Glu Ser Leu Phe Thr Ala  
 245 250 255  
 45 Val Thr Asn Phe Leu Leu Ser Leu Gly Ile His Leu Asn Pro Asn Lys  
 260 265 270  
 50 Thr Lys Arg Trp Gly Tyr Ser Leu Asn Phe Met Gly Tyr Val Ile Gly  
 275 280 285  
 55 Ser Tyr Gly Ser Leu Pro Gln Glu His Ile Ile Gln Lys Ile Lys Glu  
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 15 <223> Xaa is any amino acid  
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 20 Phe His Gln Thr Leu Gln Asp Pro Pro Ala Gly Gly Ser Ser Ser Gly  
 1 5 10 15  
 25 Thr Val Asn Pro Val Pro Thr Thr Ala Ser Pro Leu Ser Ser Ile Phe  
 20 25 30  
 Ser Arg Ile Gly Asp Pro Ala Arg Asn Met Glu Asn Ile Thr Ser Gly  
 35 40 45  
 30 Phe Leu Gly Pro Leu Leu Val Leu Gln Ala Gly Phe Phe Leu Leu Thr  
 50 55 60  
 35 Arg Ile Leu Thr Ile Pro Gln Ser Leu Asp Ser Trp Trp Thr Ser Leu  
 65 70 75 80  
 40 Asn Phe Leu Gly Gly Thr Thr Val Cys Leu Gly Gln Asn Ser Gln Ser  
 85 90 95  
 45 Pro Thr Ser Asn His Ser Pro Thr Ser Cys Pro Pro Thr Cys Pro Gly  
 100 105 110  
 Tyr Arg Trp Met Cys Leu Arg Arg Phe Ile Ile Phe Leu Phe Ile Leu  
 115 120 125  
 50 Leu Leu Cys Leu Ile Phe Leu Leu Val Leu Leu Asp Tyr Xaa Gly Met  
 130 135 140  
 55 Leu Pro Val Cys Pro Leu Ile Pro Gly Ser Ser Thr Thr Ser Thr Gly  
 145 150 155 160



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5 Pro Cys Arg Thr Cys Met Thr Thr Ala Gln Gly Thr Ser Met Tyr Pro  
165 170 175

10 Ser Cys Cys Cys Thr Lys Pro Thr Asp Gly Asn Cys Thr Cys Ile Pro  
180 185 190

15 Ile Pro Ser Ser Trp Ala Phe Gly Lys Phe Leu Trp Glu Trp Ala Ser  
195 200 205

20 Ala Arg Phe Ser Trp Leu Ser Leu Leu Val Pro Phe Val Gln Trp Phe  
210 215 220

25 Val Gly Leu Ser Pro Thr Val Trp Leu Ser Val Ile Trp Met Met Trp  
225 230 235 240

30 Tyr Trp Gly Pro Ser Leu Xaa Ser Ile Leu Ser Pro Phe Leu Pro Arg  
245 250 255

35 Pro Ile Phe Phe Cys Leu Trp Val Tyr Ile  
260 265

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